

PA3DZL

EME OF MOONBOUNCE

70 EN 23CM MET “EENVOUDIGE MIDDELEN”

RF SEMINAR

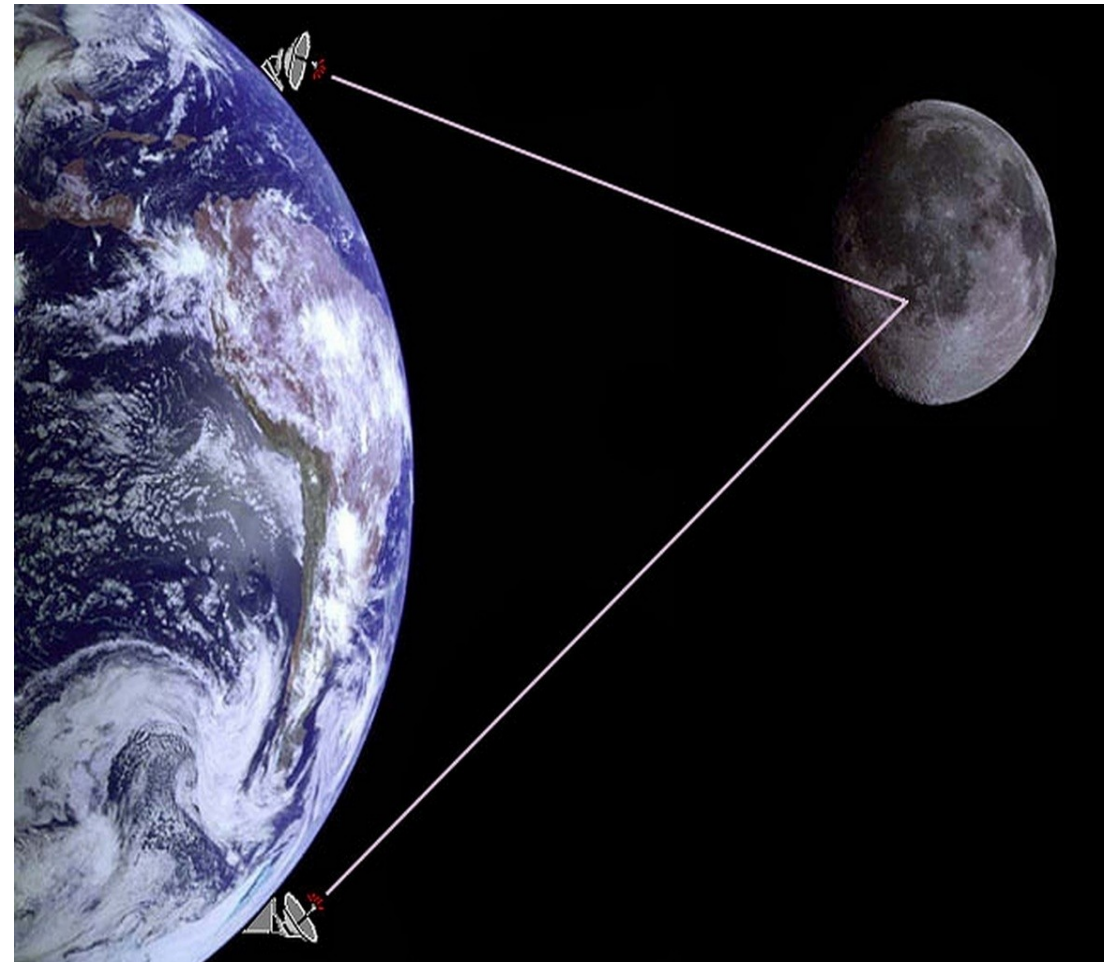


WAT IS EME – MOONBOUNCE?

Maan als passieve reflector.

De uitdaging aan onze radiohobby is om zeldzame, ongebruikelijke en moeilijke verbindingen te maken.

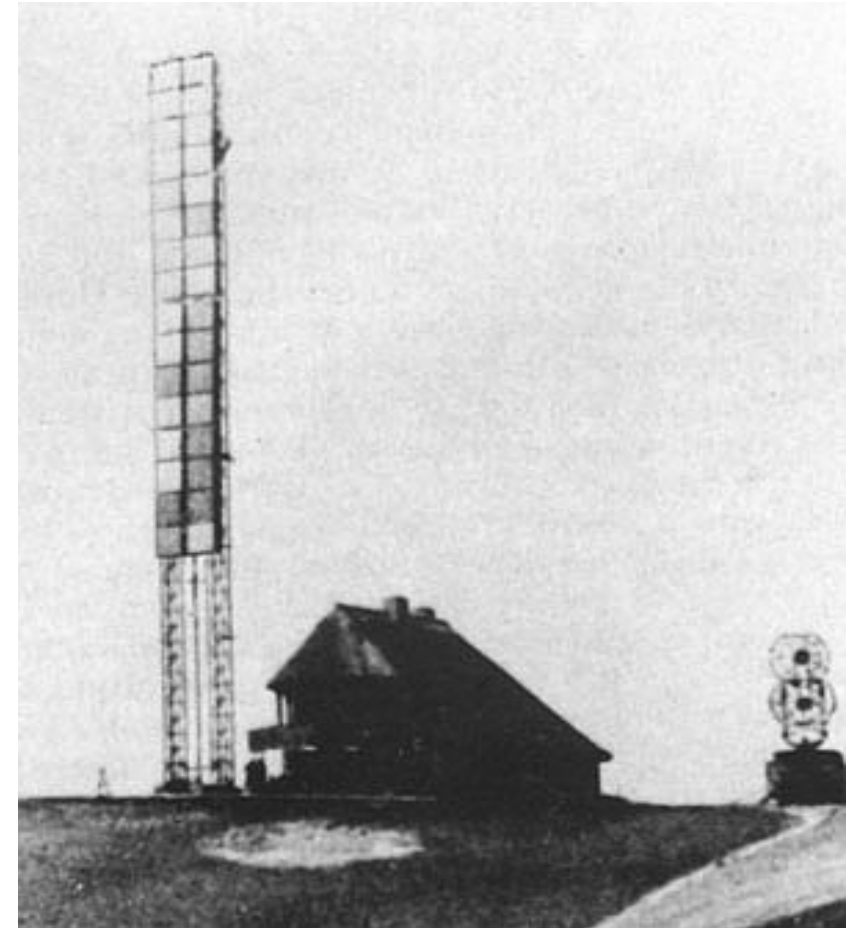
EME geeft je de mogelijkheid om wereldwijde DX te werken zelfs op VHF, UHF en SHF



EME - Moonbounce

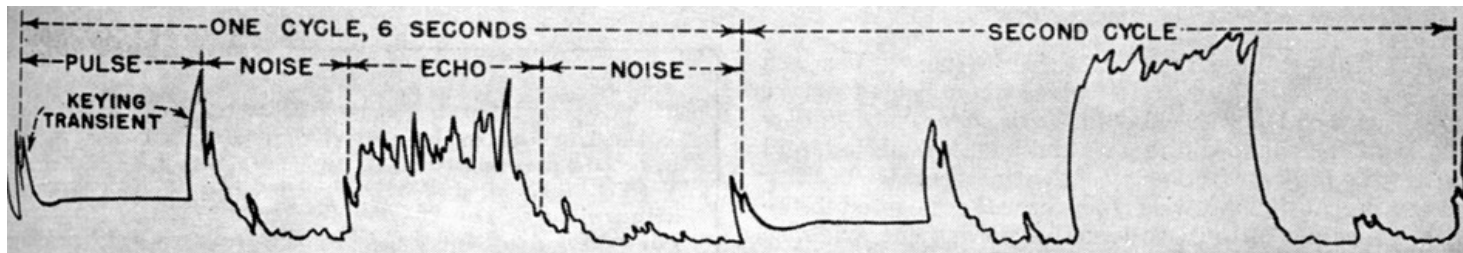
De eerste Maan echo's werden in 1944 "toevallig" ontvangen door de Duitsers tijdens de ontwikkeling van de Mammoet lange-afstands radar, op 564 MHz.

Het is lange tijd geheim gehouden !!
Pas in 1950 heeft Dr. Ing. W. Stepp de engineer die hieraan gewerkt dit bekend gemaakt.



Würzmann radar in Göhren
op Rügen eiland noord DL

EME - Moonbounce



10 Januari 1946.

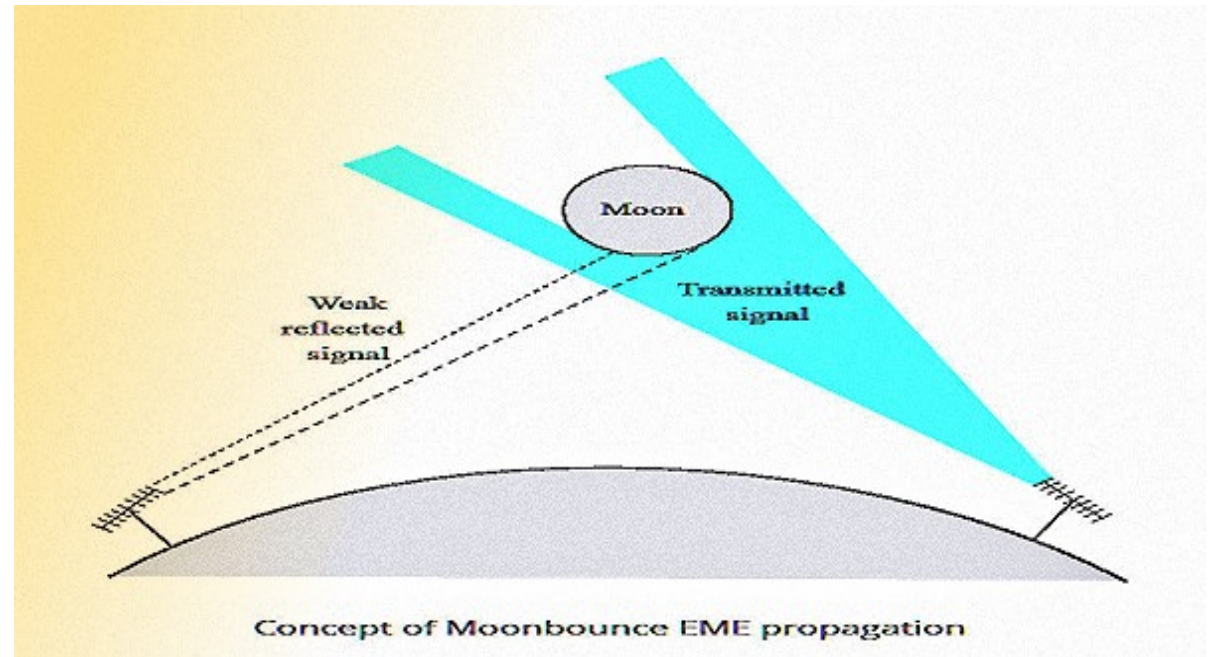
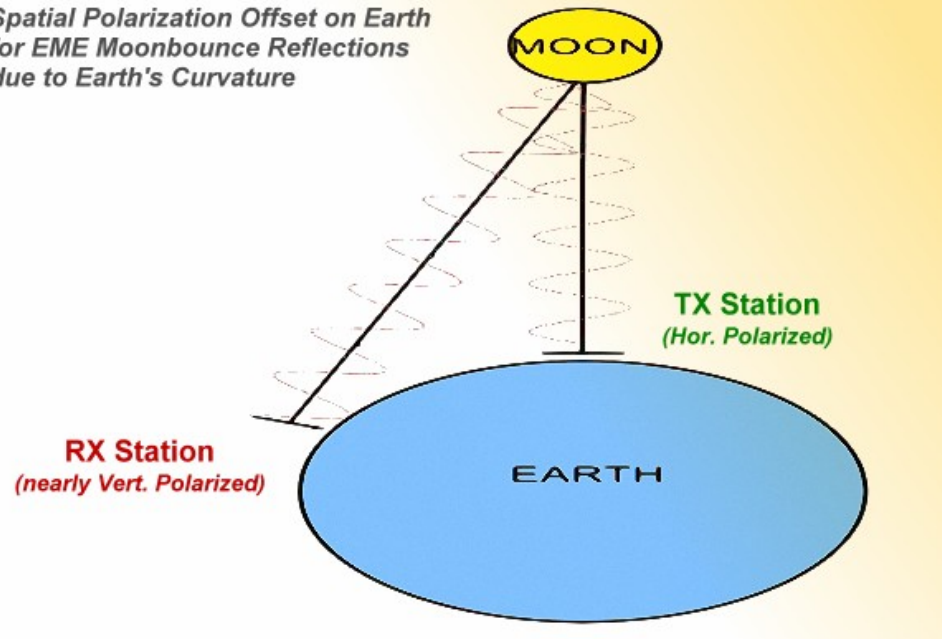
Deze antenne werd in het project Diana USA gebruikt om een radar signaal via de maan te reflecteren.

Freq. 111.5 MHz - PWR. 3kW - Ant. 24dB

EME - Moonbounce

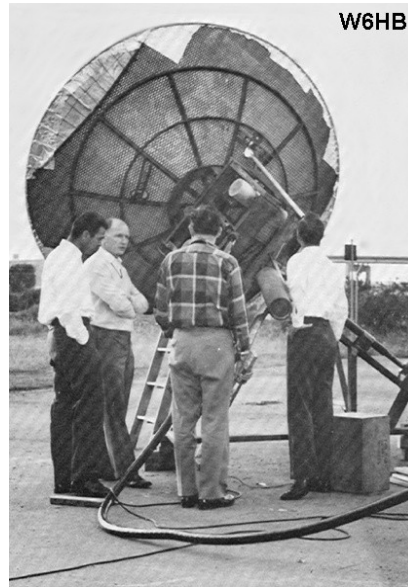
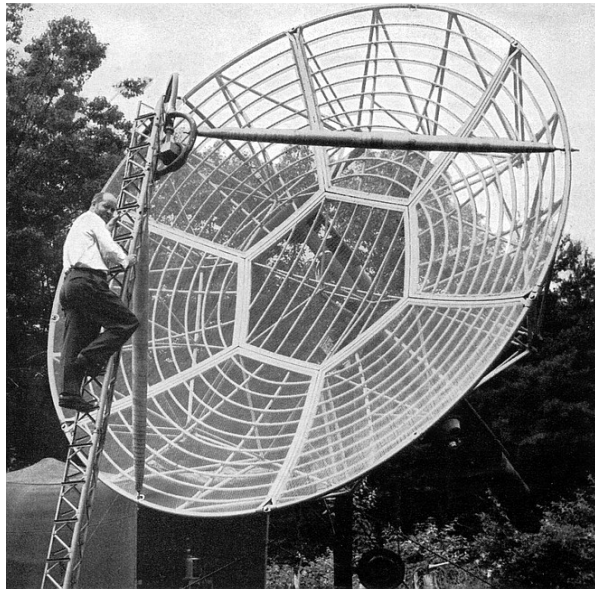
- Communicatie over 760 000km (2,4 – 2.7 sec. vertraging, zgn. ECHO)
- Trajectdemping op bijv. 432MHz is 261dB tijdens het perigeum
- Afstand tot de Maan varieert, daardoor 2,2dB signaalverschil
- Maan reflecteert slechts 'n klein gedeelte van het signal
- Sky noise wijzigt met de locatie van de Maan, nieuwe maan !
- Doppler shift, hierbij verschuift de echo frequentie (2m >300Hz/24GHz >50kHz!!)
- Faraday kan de polarisatie draaien op 50, 144 en 432MHz. 1296 niet !

*Spatial Polarization Offset on Earth
for EME Moonbounce Reflections
due to Earth's Curvature*

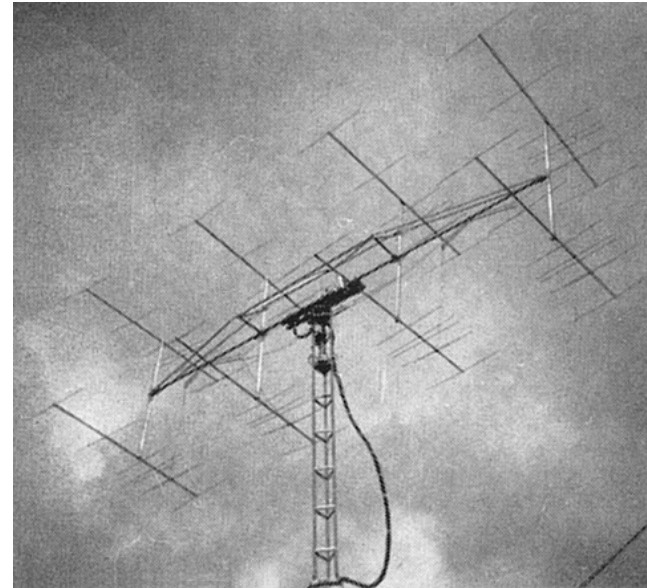


EME – Moonbounce – door Radioamateurs

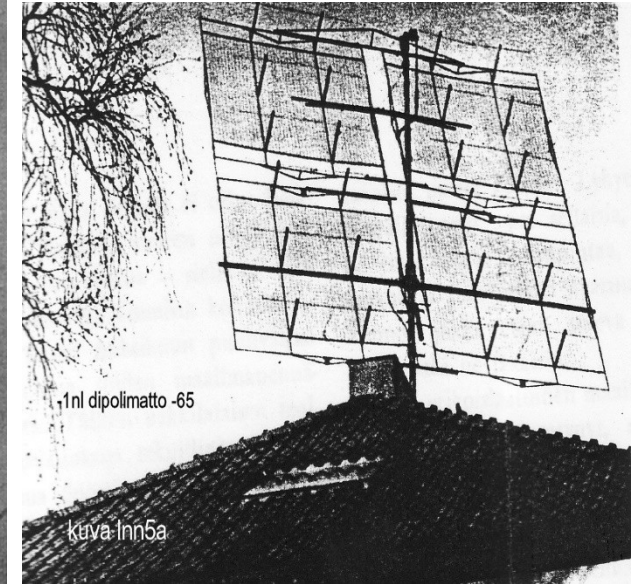
- 15 Juli 1950 — De eerste moon echo's op 144MHz
- **27 Januari 1953** — Eerste **144MHz** QSO, W4AO → W3GKP
- **21 Juli 1960** — Eerste **1296MHz** QSO, Massachusetts → California
- **11 April 1964** — Eerste **144MHz** QSO, U.S.A. W6DNG → OH1NL Europa Finland
- **20 Mei 1964** — De eerste **432MHz** moonbounce, Massachusetts → Puerto Rico op 432MHz



W1FZJ + W1BU 5m/400W → W6HB 2.3m/400W
Eerste 1296MHz EME QSO



W6DNG 8x7el → OH1NL 24el. coll 6x6m
Eerste 144MHz EME QSO U.S.A → Europa




EME – Moonbounce is mijn PASSIE

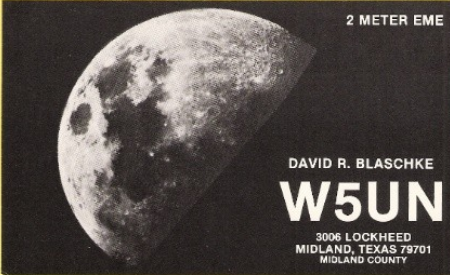
- Radiozendamateur sinds 1983
- Eerste EME QSO in 1986 op 2m W5UN
- Daarna ook 6m, 70, 23, 13, 9, 6, 3 en 1.25cm
- QRV op 9 verschillende banden

PA3DZL 144 Mhz EME
Mijn eerste EME verbinding met W5UN

Verbinding met W5UN gemaakt op:
23-03-1986 om 03.54 UTC "O" / "rO"



Mijn station destijds (de foto):
*2 x 19el. CC Boomers vaste el. 5°
*CFY13 preamp ca. 0,6dB NF a/d ant.
*4CX250R ca. 400 Watt output



2 METER EME

DAVID R. BLASCHKE
W5UN
3006 LOCKHEED
MIDLAND, TEXAS 79701
MIDLAND COUNTY

Radio: PA3DZL... Confirming our 2X QSO of MAR 23, 1986
0354 GMT
144.885 MHz, sigs...
Ant: WFFY-888-000CAR EME
Xant: W up 1.5KW
Rev: IC 2.51, PBE 1482
Amp: 8X170
Ant: 2x 17el. 7412
Remarks: Harry, TX, OK, 16A
ECHO: EME, 818

Post Card PLACE STAMP HERE
This Side For Address
574 Stuyvesant

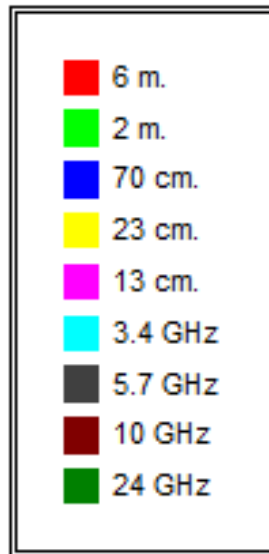
Dave Blaschke - W5UN
9102 Kings Drive
Merrill, Texas 77578

73, PSE GBL (TKX)

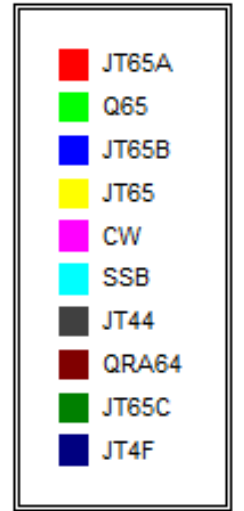


TOT NU TOE > 6500 MOONBOUNCE QSO'S

QSO'S PER BAND



QSO'S PER MODE



MAAN ECHO OP 2320MHZ PA3DZL

GEBRUIK 144MHZ ALS MIDDENFREQUENT MET TRANSVERTER

Video wordt gestart, QRX...



WAAROM 70 en 23cm MOONBOUNCE?

- **Veel activiteit en er zijn GROTE stations die je zeker kunt werken**
- **Relatief kleine antennes**
- **Transceivers met 70 en 23cm aan boord**
- **Power maken “relatief eenvoudig” zonder al te veel kosten**
- **Over het algemeen weinig QRM vooral op 23cm**
- **Het bouwen van je station hoeft in 1^{ste} instantie niet optimaal te zijn, dwz preamp, kabeldemping, type antenne, uitrichten e.d.**



Dwingeloo PI9CAM 25M



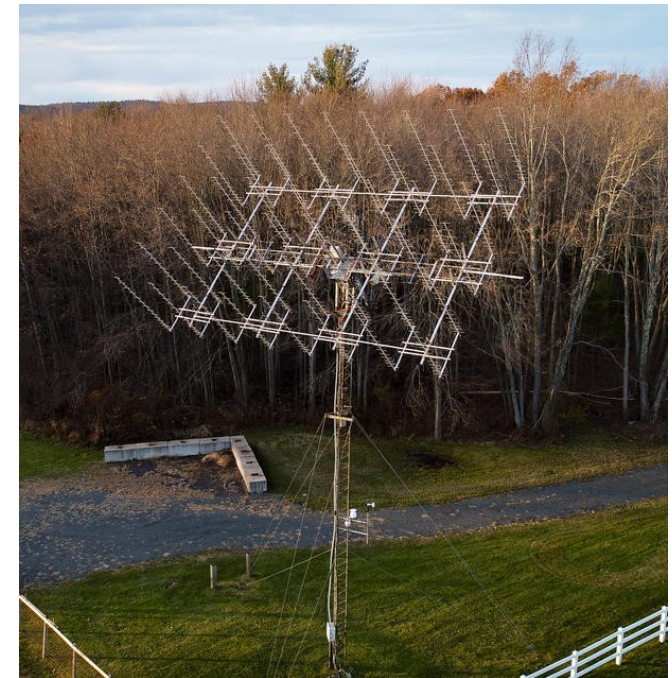
DAN, HB9Q 10M +15.28M



Bernd, DL7APV 128 x 11el yagis



Zdenek, OK1DFC 8M Offset



Frank, NC1I 48 x 15el. Yagis



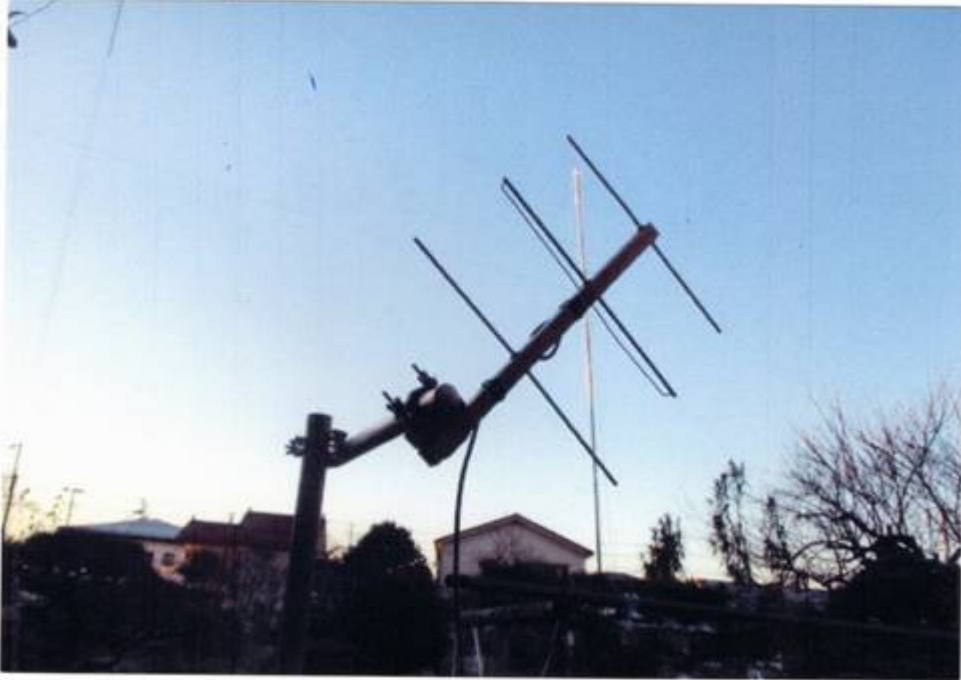
Jan, DL9KR 16 x 26el. Yagis

MOONBOUNCE MET KLEINE ANTENNE (2018)



5 QSO's DL7APV, UA3PTW, HB9Q,
NC1I in JT65B en DL9KR in CW !!

MOONBOUNCE MET KLEINE ANTENNE



432MHz EME met een 3el. + Preamp
JH7PAV FT991 barefoot 50W



432MHz EME vanaf het balkon!
JF2AIA met 15el. and 30W

EME – Moonbounce – door Harrie PE1JXI

- 70cm o.a. gewerkt met NC1I en DL7APV
- 19el. Kruisyagi H+V ontwerp DG7YBN, Preamp alles EIGENBOUW
- TRX Yaesu FT991 50W output



1910	Tx	919	:	1000	Hz		
1839	-24	3.0	1384	:	CQ NC1I FN32	NA	
1912	Tx	919	:	NC1I	PE1JXI	JO20	
1914	Tx	1328	:	NC1I	PE1JXI	JO20	
1916	Tx	1328	:	NC1I	PE1JXI	JO20	
1918	Tx	1328	:	NC1I	PE1JXI	JO20	
1919	-22	2.8	1285	:	PE1JXI	NC1I	-28 q0
1920	Tx	1328	:	NC1I	PE1JXI	JO20	
1921	-20	2.8	1282	:	PE1JXI	NC1I	-28 q0
1922	Tx	1328	:	NC1I	PE1JXI	JO20	
1924	Tx	1328	:	NC1I	PE1JXI	JO20	
1925	-21	2.8	1270	:	PE1JXI	NC1I	-28 q0
1926	Tx	1328	:	NC1I	PE1JXI	JO20	
1928	Tx	1272	:	NC1I	PE1JXI	JO20	
1929	-20	2.8	1259	:	PE1JXI	NC1I	-28 q3
1931	-25	2.8	1252	:	PE1JXI	NC1I	-28 q3
1932	Tx	1272	:	NC1I	PE1JXI	JO20	
1933	-18	2.9	1250	:	PE1JXI	NC1I	-28 q3
1934	Tx	1272	:	NC1I	PE1JXI	JO20	
1935	-24	2.9	1245	:	PE1JXI	NC1I	-28 q3
1936	Tx	1272	:	NC1I	PE1JXI	R-24	
1938	Tx	1272	:	NC1I	PE1JXI	R-24	
1940	Tx	1272	:	NC1I	PE1JXI	R-24	

MOONBOUNCE MET KLEINE ANTENNE



- Nic G3YEG heeft zijn 432MHz ant. 21el. Tonna op zolder !!
- Icom IC-9700 – 60W
- Kijk 'ns op de QRZ.COM site

MOONBOUNCE MET ZEER KLEINE ANTENNE



- 1x1el yagi en 60W QSO op 432 MHz
- MX0CNS, Tom. Hij ontving DL7APV -- 23 en kreeg -29.
- Dit was “an amazing” QSO
- QRPPP EME!

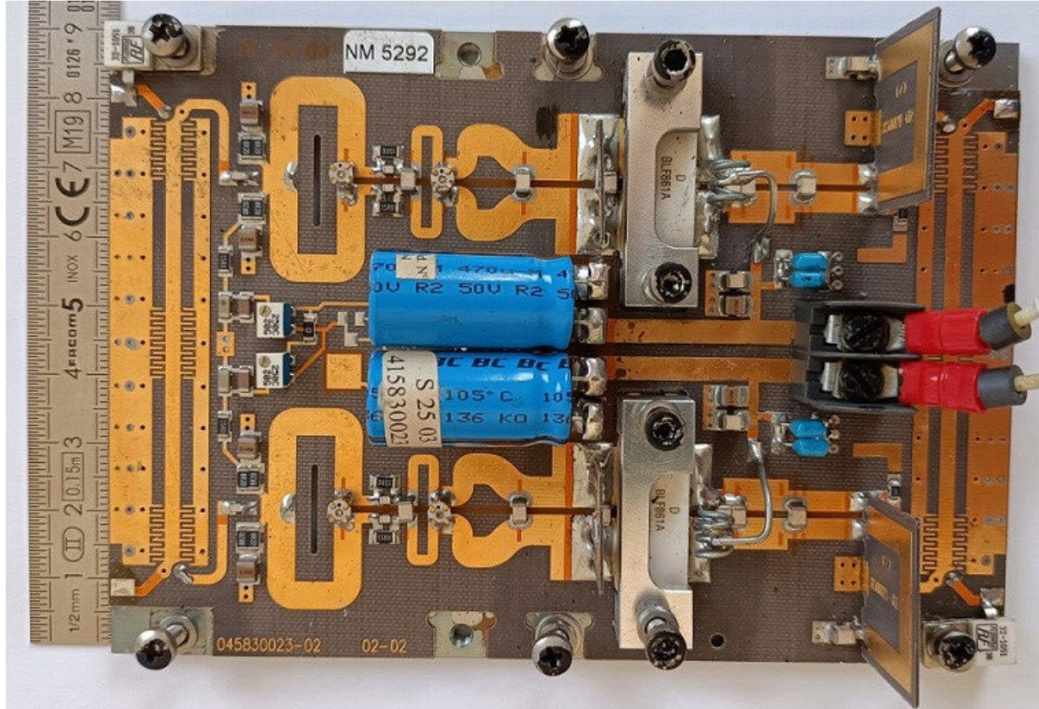
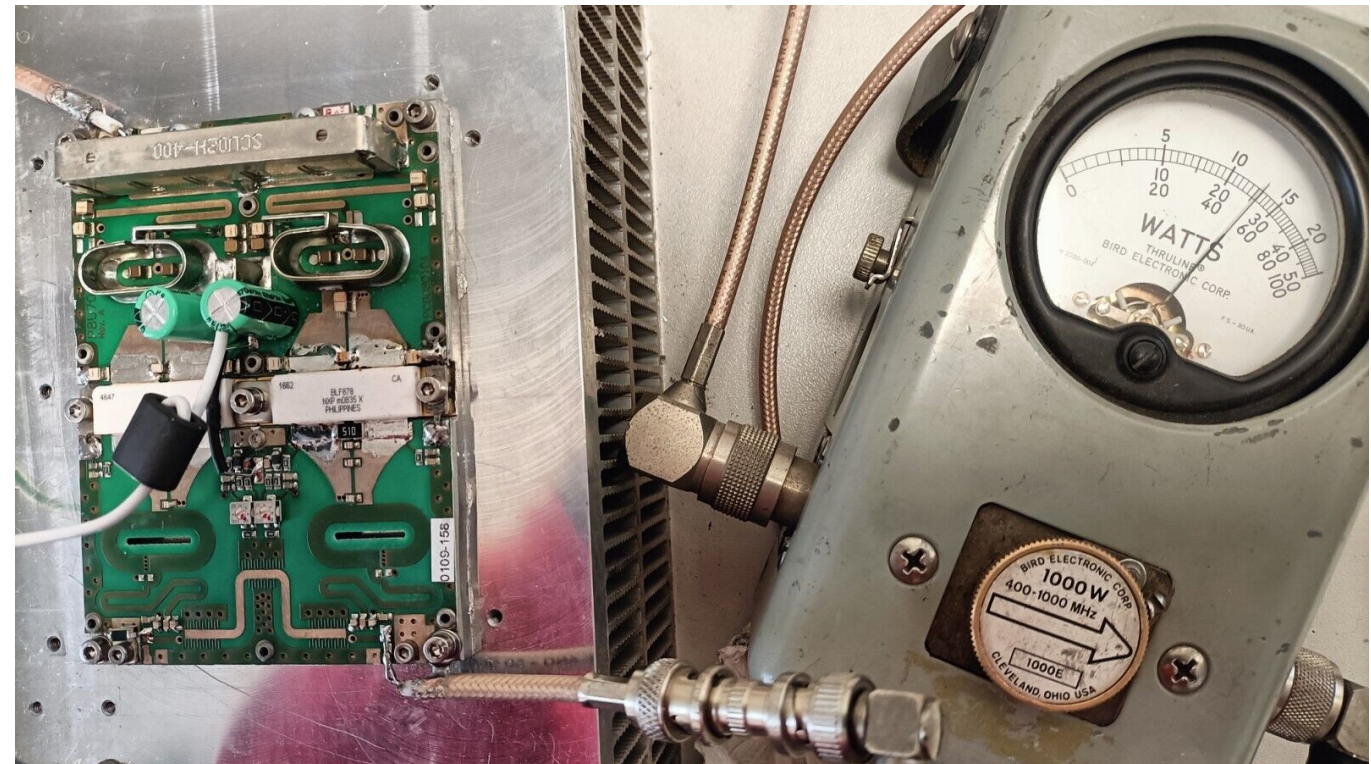
PA3DZL 432MHZ EME PORTABEL

(25 FEBR. 2023)

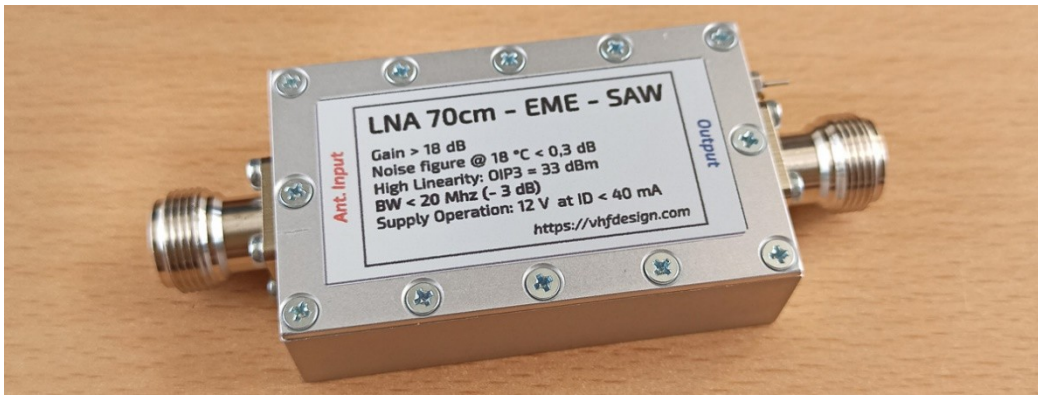


WAT MEER POWER MAKEN OP 432MHz IS EENVOUDIG

OP EBAY : 500W – 432MHz SSPA VOOR 140 EURO



OP EBAY: 250W – 432MHZ SSPA VOOR 115 EURO



VHF DESIGN WEBISTE

PREAMPS 432MHz

KUHNE electronic WEBSITE



Antennas-Amplifiers WEBSITE



MOONBOUNCE MET EENVOUDIGE MIDDELEN (2018)



35 QSO's 34 x JT65C en 1 x CW !
+ 25 QSO's vanaf thuis QTH test



1296MHz 67el. SHF Yagi – 120W

MOONBOUNCE MET EENVOUDIGE MIDDELEN



1296MHz **ZL2MQ** 45el LOOP Y- 35W



1296MHz **DP1POL** Zuidpool
67el yagi – 400W

MOONBOUNCE MET EENVOUDIGE MIDDELEN



1296MHz **RAØACM** 49el yagi – 75W
vanaf zijn balkon

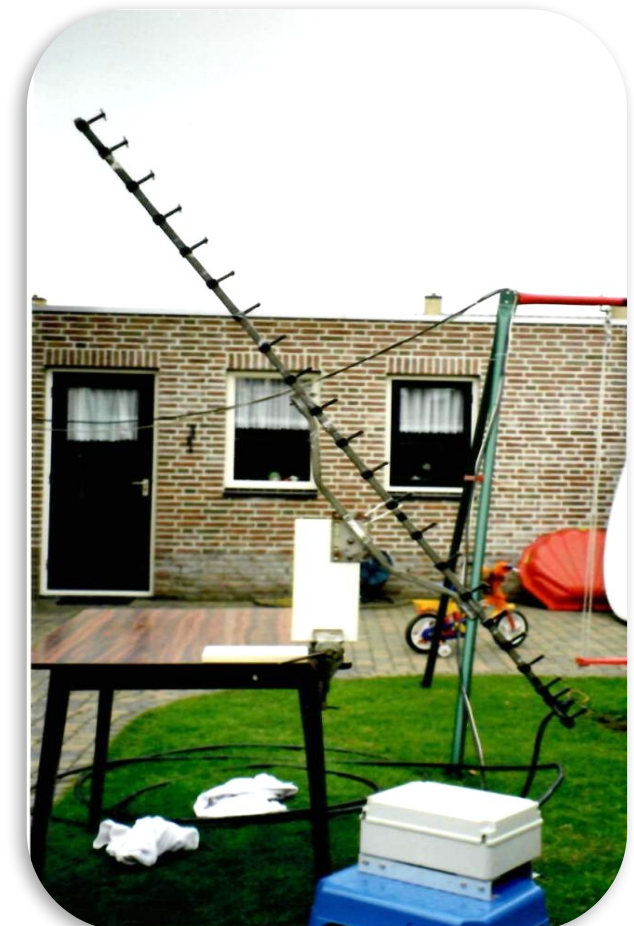


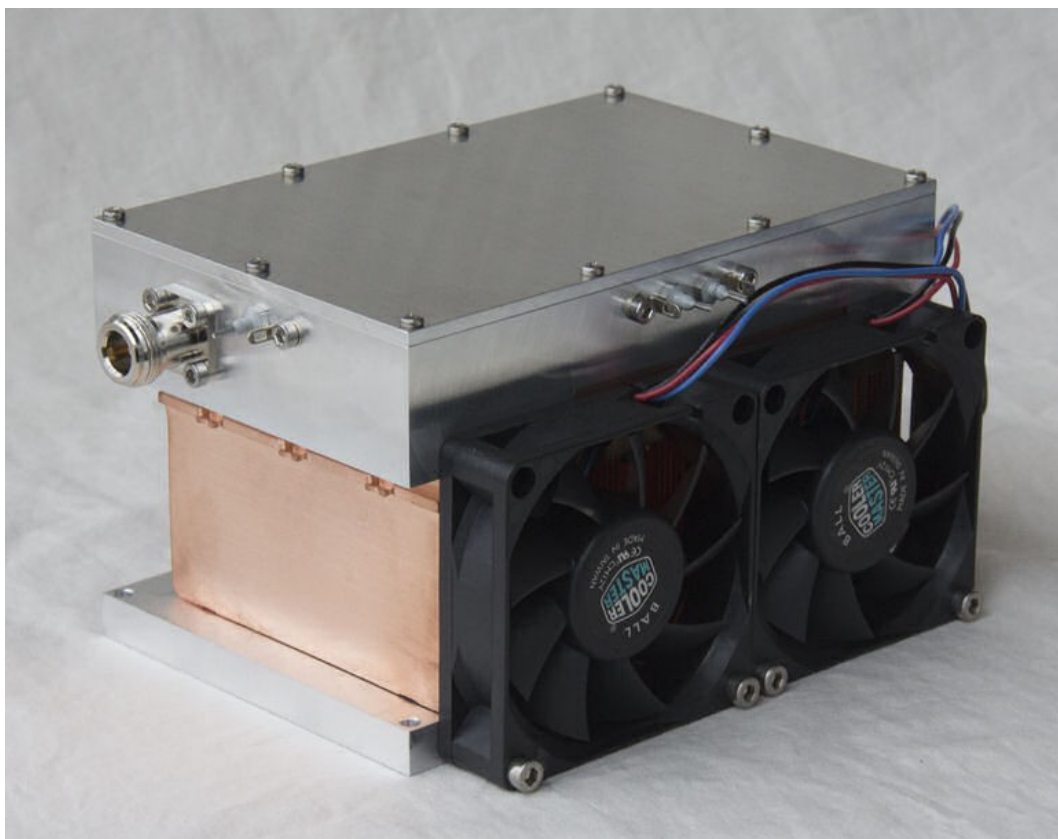
1296MHz **3A/DL3OCH** 59el yagi –
geen preamp en 80W

1296MHZ CW EME QSO MET TM8EME (1998)

SPECIALE ACTIVITEIT I.V.M. 1998 EME PARIJS CONFERENTIE
NANCAY RADIOTELESCOOP / 8000M2 – 1000-3500MHZ

23EL. F9FT YAGI
15.6DBD BOOM 1.75M
150W@ANT - MGF1400





PE1RKI WEBSITE STAAT VEEL INFORMATIE

**WAT MEER POWER MAKEN OP 1296MHz
100 tot 250W goed betaalbaar**

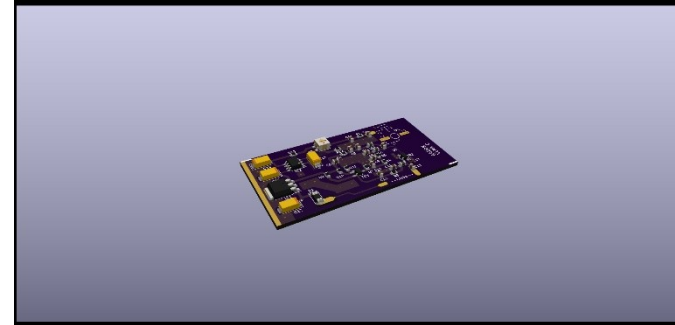
DF9IC MOSFET SSPA ZIE INTERNET



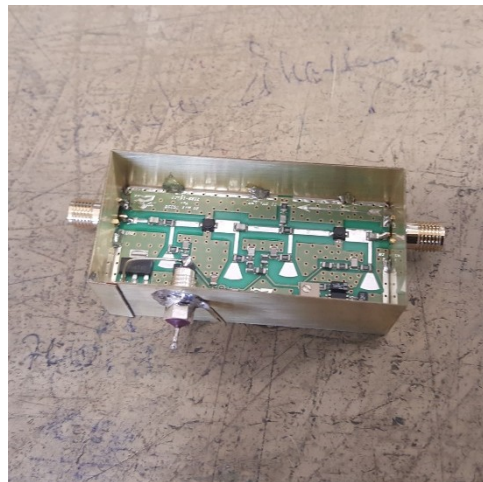
PREAMPS 1296MHz



VHF DESIGN WEBSITE



G4DDK website eigenbouw



SM5DGX Website

KUHNE electronic Website



HB9Q EME LOGGER 432 EN HOGER

HB9Q | LOGGER x +

logger.hb9q.ch

50 MHz 144 MHz **432 MHz** 1296 MHz 23xx MHz 3400 MHz 5760 MHz 10xxx MHz 24048 MHz 47088 MHz 76032 MHz

@call write your message here...

UTC CQ 432.097 1st 2nd Q65-60B - 1400Hz - CFOM search...

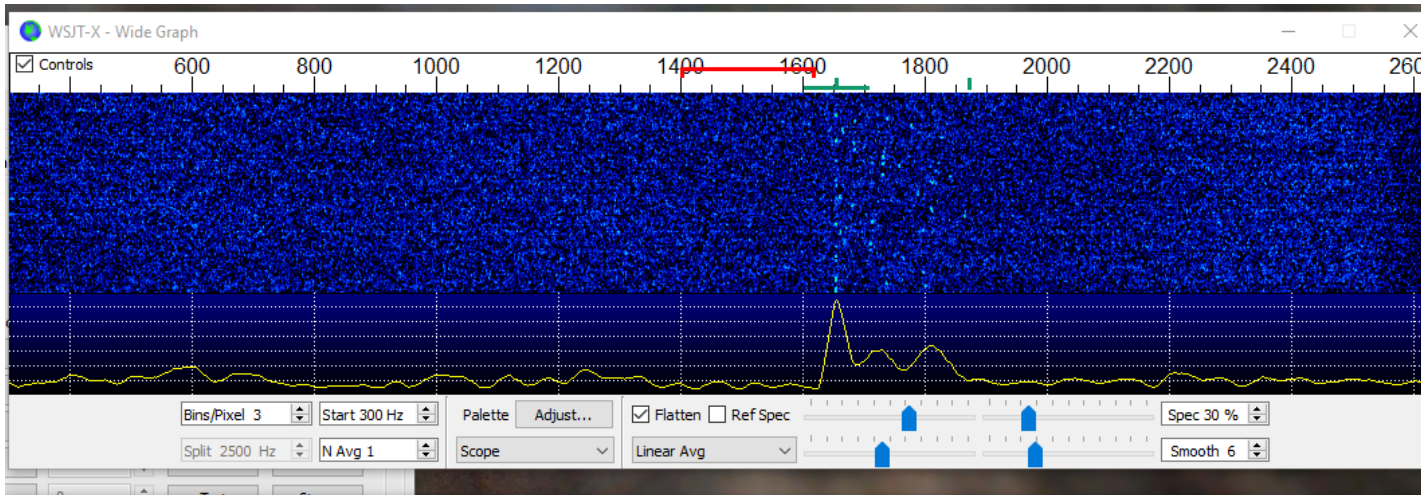
12:01	@UA3PTW: Hi RX you with -18db . Calling you	@ EB1AO Jose
12:01	@OK1KIR: pse 2 khz down birdie on qrg	@ OE3JPC Hannes
12:00	@VK4EME: Same from you Allan, did need some screenshots for an EME presentation Thursday 2nd :-)	@ PA3DZL Jac
12:00	@OE3JPC: will call after KIR as digi initial, you are speaker copy	@ OK1DFC Zdenek
12:00	@DL7APV: R, qrx for your call on 434.063	@ VU2LBW Lucky
11:59	@PA3DZL: Just made it before MS Jac...Best -11...Many thanks indeed...73 G!	@ VK4EME Allan
11:59	***** CQ 432.057 1st Q65-60B *****	@ UA3PTW Dmitrij
11:59	@OE3JPC: TNX we go	@ OK1KIR Tonda(Vlada)
11:59	@VU2LBW: yes, ok I qsy	@ DL7APV Bernd
11:58	@DL7APV: Sure Bernd!. You can tx on 434.063 too?	@ VU2LBW Lucky
11:58	@JR7PJS: Kazu ge , tnx QSO !	@ UA3PTW Dmitrij
11:58	@EA5WA: Hello Juan Carlos, nice to greet you here	@ EA3EA Jaume
11:58	1156 -21 2.5 1303 : CQ OK1VUM JN79	@ JE1TNL Kaz
11:58	@PA3DZL: Big signal here in VK Jac	@ VK4EME Allan
11:57	@OK1KIR: rr pse call	@ OE3JPC Hannes
11:57	@UA3PTW: Thank you for QSO after a long absence. B-04 GL73.	@ JR7PJS Kazu
11:56	@OE3JPC: GD Hannes you are here -14 pse test on 070 we 1st CFOM 1000 Hz OK??	@ OK1KIR Tonda(Vlada)
11:56	@VU2LBW: should we try 434 agn I can call u there ?	@ DL7APV Bernd
11:55	1154 -9 2.6 1478 : CQ OK1DFC JN79 q0 Czech Rep.	@ UT5DL Slava
11:55	@JE1TNL: TNX Kaz-san for UFB QSO	@ PA3DZL Jac
11:54	Stopped CQ...	@ JE1TNL Kaz
11:54	@HB9Q: hi dan, 432 maybe :)	@ YC1HVZ Farid
11:53	@HB9Q: 432 maybe if u can possible :)	@ YC1HVZ Farid
11:53	@PA3DZL: RR	@ VK4EME Allan
11:53	@PA3DZL: TNX for QSO, Jac ! B-20 73 GL! : 1147 -20 2.7 1407 : JE1TNL PA3DZL JO21 q0	@ JE1TNL Kaz
11:53	@UA3PTW: Welcome, Dmitrij. I can only RX on 432!	@ VU2LBW Lucky
11:53	1151 -15 2.7 1576 : XXXXXX SP6LKI XX q0	@ UT5DL Slava
11:52	@VK4EME: :097 DZL 1st CFOM ok?	@ PA3DZL Jac
11:51	***** CQ 432.088 1st Q65-60B 1500 *****	@ OK1VUM Mila
11:51	@PA3DZL: Just about 2 deg Jac...QRG?	@ VK4EME Allan
11:51	***** CQ 432.092 1st Q65-60B CFOM 1500Hz 1st *****	@ PA0BAT Gerard
11:51	No problem Mick, I was long time lunch and other job. We have QSO and QSL's	@ OH3DP Hannu

DL4DTC - Norbert
DL4ZAG - Kurt
DL7APV - Bernd
DU9JJY - TAZ
EA3EA - Jaume
EA5CJ - Jacinto
EA5WA - Juan Carlos
EB1AO - Jose
G3LTF - Peter
GW4HDF - Viv
HB9GSE - Marco
HB9Q - Dan
JE1TNL - Kaz
JG2TSL - Hide
JJ1XTG - Socho
JR7PJS - Kazu
JS1LQI - Masa
OE3JPC - Hannes
OH3DP - Hannu
OK1DFC - Zdenek
OK1KIR - Tonda(Vlada)
OK1VUM - Mila
OK2AQ - Mirek
PA0BAT - Gerard
PA3GAN - Erwin
R50EME - Team
RD3FD - Sergey
S51ZO - Joze
SQ9CYD - Michał
UA3PTW - Dmitrij
UT5DL - Slava
VK4EME - Allan
VU2LBW - Lucky
YC1HVZ - Farid
ZS4TX - Bernie

last seen on logger >1h
4J6D - Andrey
AA5C - Greg

© 2023 by HB9Q, powered by a l o g i s a g

13:02
26-2-2023



WSJT-X v2.6.1 by K1JT et al.

File Configurations View Mode Decode Save Tools Help

Single-Period Decodes					Average Decodes				
UTC	dB	DT	Freq	Message	UTC	dB	DT	Freq	Message
1146	-19	2.7	1508	CQ JE1TNL PM95 q0 Japan	1148	-19	2.7	1508	CQ JE1TNL PM95 q32 Japan
1150	-20	2.6	1508	PA3DZL JE1TNL -20 q3	1149	Tx	1400		JE1TNL PA3DZL JO21
1152	-19	2.7	1506	PA3DZL JE1TNL RR73 q3	1150	-20	2.6	1508	PA3DZL JE1TNL -20 q3
1157	-15	2.8	1658	PA3DZL VK4EME -17 q3	1151	Tx	1400		JE1TNL PA3DZL R-20
1159	-16	2.8	1654	PA3DZL VK4EME RR73 q3	1152	-19	2.7	1506	PA3DZL JE1TNL RR73 q3
1201	-18	2.8	1654	TU JAC 73 GL q0	1153	Tx	1400		JE1TNL PA3DZL 73
					1154	Tx	1400		VK4EME PA3DZL JO21
					1154	Tx	1400		VK4EME PA3DZL JO21
					1156	Tx	1400		VK4EME PA3DZL JO21
					1157	-15	2.8	1658	PA3DZL VK4EME -17 q3
					1158	Tx	1400		VK4EME PA3DZL R-15
					1159	-16	2.8	1654	PA3DZL VK4EME RR73 q3
					1200	Tx	1400		VK4EME PA3DZL 73
					1201	-18	2.8	1654	TU JAC 73 GL q0
					1201	-18	2.8	1654	TU JAC 73 GL q0
					1202	Tx	1400		VK4EME PA3DZL 73
					1202	Tx	1400		73S TNX CUL

Log QSO Stop Monitor Erase Clear Avg Decode **Enable Tx** Halt Tx Tune Menus

70cm **S** **432,096 730** Tx even/1st
 Tx 1400 Hz F Tol 50 Submode B
 Rx 1654 Hz Max Drift 20
 Report -18 T/R 60 s
 Sh Auto Seq CQ: First Tx6

Generate Std Msgs Next Now Pwr
 VK4EME PA3DZL JO21 Tx 1
 VK4EME PA3DZL -18 Tx 2
 VK4EME PA3DZL R-18 Tx 3
 VK4EME PA3DZL RR73 Tx 4
 73S TNX CUL Tx 5
 CQ PA3DZL JO21 Tx 6

Tx: 73S TNX CUL Q65-60B Last Tx: VK4EME PA3DZL 73 4 4 19/60

QSO MET JE1TNL EN VK4EME

WSJT-X - Astronomical Data

2023 feb 26
 UTC: 12:02:19
 Az: 88.5
 El: 25.9
 SelfDop: 545
 Width: 6
 Delay: 2.59
 DxAz: 296.1
 DxEl: 2.2
 DxDop: -343
 DxWid: 4
 Dec: 21.0
 SunAz: 182.6
 SunEl: 29.5
 Freq: 432.1
 Tsky: 23
 Dpol: 18.6
 MNR: 2.0
 Dist: 388115
 Dgrd: -2.0

Doppler tracking

- Full Doppler to DX Grid
- Own Echo
- Constant frequency on Moon
- On DX Echo
- Call DX
- None

Sked frequency

Rx: 432,097 000
 Tx: 432,097 000

Press and hold the CTRL key to adjust the sked frequency manually with the rig's VFO dial or enter frequency directly into the band entry field on the main window.

Echo Mode

RIT 0 Hz Dither

Doppler tracking

Veel belangrijke info in WSJT !!

OVER ZELDZAME VERBINDINGEN GESPROKEN 😊



TX5S CLIPPERTON ISLAND
gewerkt 24 januari 2024

0047 4 3.1 1996 : TX5S OK1DFC RRR q0

23cm
0048 -21 3.2 1494 : OK1DFC TX5S 73 q0

23cm
0050 -19 3.1 1494 : OK1KIR TX5S -13 q0

23cm
0052 -21 3.1 1492 : PA3DZL TX5S R-13 q3

23cm
0054 -20 2.9 1495 : NC1I TX5S -17 q0

23cm
0056 -21 3.1 1494 : OK1KIR TX5S RR73 q0

0049 Tx 2037 : TX5S PA3DZL -19
0051 Tx 2037 : TX5S PA3DZL -19
0052 -21 3.1 1492 : PA3DZL TX5S R-13 q3
0053 Tx 2037 : TX5S PA3DZL RRR
0055 Tx 2037 : TX5S PA3DZL RRR

Log QSO Stop Monitor Erase Clear Avg Decode Enable Tx Halt Tx Tune Menu

23cm S 1.296,084 220 Tx even/1st
Tx 2037 Hz
H DX Call TX5S DX Grid DK50JH
F Tol 50 Submode C
FT8 Az: 296 10712 km Rx 1492 Hz Max Drift 20
FT4 Lookup Add Report -19
MSK T/R 60 s
Q65 2024 jan 24
JT65 00:57:03
 Sh Auto Seq CQ: None Tx6

Generate Std Msgs Next Now Pwr

Message	Next	Now	Pwr
TX5S PA3DZL JO21	<input type="radio"/>	<input type="radio"/>	<input type="text" value="Tx 1"/>
TX5S PA3DZL -19	<input type="radio"/>	<input type="radio"/>	<input type="text" value="Tx 2"/>
TX5S PA3DZL R-19	<input type="radio"/>	<input type="radio"/>	<input type="text" value="Tx 3"/>
TX5S PA3DZL RRR	<input type="radio"/>	<input checked="" type="radio"/>	<input type="text" value="Tx 4"/>
TX5S PA3DZL 73	<input type="radio"/>	<input type="radio"/>	<input type="text" value="Tx 5"/>
CQ PA3DZL JO21	<input type="radio"/>	<input type="radio"/>	<input type="text" value="Tx 6"/>

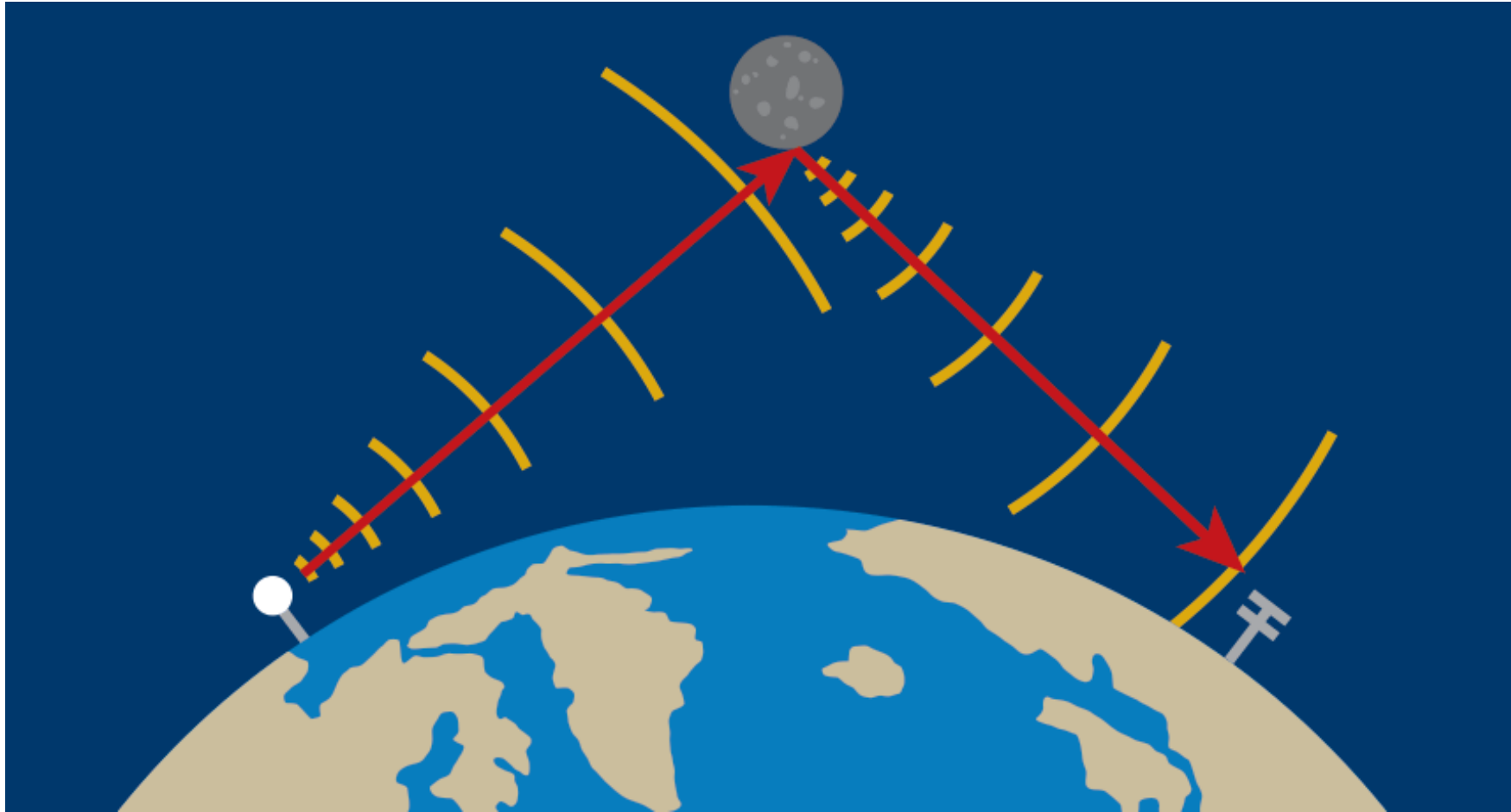
Receiving Q65-60C Last Tx: TX5S PA3DZL RRR 42 33 3/60

Clipperton Island is een
onbewoond karaalatol in
het noorden van de Grote
Oceaan. Afm. 4 x 2.9km
Frans grondgebied
Kosten DXpeditie \$160.000

INFO OVER MOONBOUNCE

Websites van:

- **Bob, KA1GT**
- **Dan, HB9Q hierop ook de link naar de HB9Q logger**
- **Bernd, DL7APV**
- **432MHz and Above EME Newsletters by K2UYH (W6/PAØZN)**



HEEFT U NOG
VRAGEN?

BEDANKT VOOR UW AANDACHT

